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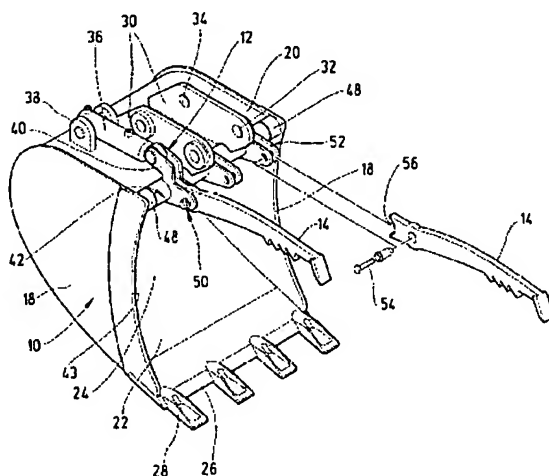
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(54) Title: WORKING TOOL FOR A PIECE OF EARTH-MOVING MACHINERY

(54) Bezeichnung: ARBEITSWERKZEUG FÜR EINE ERDBAUMASCHINE



(57) Abstract: The invention relates to a working tool for a piece of earth-moving machinery comprising a digging device (10) that is embodied as a bucket or scoop and delimits an accommodation space (24) for the material that is to be excavated, and a built-on device (12) which is disposed on the digging device (10), is removable from the support of the piece of earth-moving machinery as a structural unit along with said digging device (10), and is provided with an additional tool (14, 16, 17) that is pivotable towards the charging hole (43) of the accommodation space (24) by means of a swivel drive (36). In order to increase the number of possible uses, the swivel drive (36) encompasses a swivel shaft (42) which is located above the charging hole (43) and extends along more than half the width thereof while the additional tool (14, 16, 17) can be fixed to the swivel shaft (42) via connecting means (50).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(57) Zusammenfassung: Die Erfindung betrifft ein Arbeitswerkzeug für eine Erdbaumaschine mit einem als Löffel oder Schaufel ausgebildeten Grabgerät (10), das einen Aufnahmeraum (24) für das abzutragende Gut begrenzt, und mit einem an dem Grabgerät (10) angeordneten und als Baueinheit mit diesem von dem Stiel der Erdbaumaschine lösbaren Anbaugerät (12), das ein mittels Schwenkantrieb (36) gegen die Ladeöffnung (43) des Aufnahmeraums (24) schwenkbares Zusatzwerkzeug (14,16,17) aufweist. Um die Einsatzmöglichkeiten zu verbessern, wird vorgeschlagen, dass der Schwenkantrieb (36) eine oberhalb der Ladeöffnung (43) angeordnete und sich über mehr als deren halbe Breite erstreckende Schwenkwelle (42) aufweist, und dass das Zusatzwerkzeug (14,16,17) über Verbindungsmittel (50) an der Schwenkwelle (42) fixierbar ist.

Working tool for a piece of earth-moving machinery**Description**

The invention relates to a working tool for an earth-moving machine, in particular a digger, having a digging device embodied as a scoop or bucket which is arranged so as to be pivotable on an arm or beam of the earth-moving machine and delimits a receiving space for the material to be excavated, and having an add-on device which is arranged on the digging device and can be detached from the arm as a modular unit with said digging device, which add-on device has an auxiliary tool which can be pivoted relative to the loading opening of the receiving space by means of a pivoting drive.

Digger scoops of said type are known which have special auxiliary devices built on for defined work applications. These auxiliary devices have a pivoting mechanism which is matched to the tool, in which pivoting mechanism a linear drive movement of a hydraulic cylinder, which is generally seated on the digger arm, is converted into the tool movement by means of pivoting levers in pin supports. The limited application possibilities and the high expenditure in re-tooling are considered to be disadvantageous here.

Proceeding from this, the invention is based on the object of improving a working tool of the type specified in

the introduction in such a way that it can be used variably with little assembly expenditure and without the basic function of the scoop or bucket being restricted.

The combination of features specified in patent claim 1 is proposed to achieve said object. Advantageous embodiments and refinements of the invention can be gathered from the dependent claims.

The invention is based on the concept of allowing an auxiliary device to pivot without there being any interfering contours on the base tool. It is accordingly proposed according to the invention that the pivoting drive has a pivoting shaft, which is arranged above the loading opening and extends over more than half of the width thereof, for a limited pivoting movement, and that the auxiliary tool can be fixed to the pivoting shaft by connecting means so as to be exchangeable and/or moveable in terms of position. This makes it possible to optimally utilize the width of the scoop or bucket in order to flexibly provide further tool functions. The loading space is not adversely affected as a result, and it is not necessary to carry out any modification measures outside the working tool, so that the earth-moving machine is provided with additional functionality without excessive expenditure.

The pivoting shaft advantageously runs parallel to and at a distance from the arm pin provided on the arm for a pivoting movement of the digging device. This makes it

possible for the entire tool to be easily mounted on the digger while conversely not impeding the exchange of the auxiliary tool. A further improvement is provided in this regard if the pivoting shaft extends in a linearly continuous fashion. The pivoting shaft preferably extends over substantially the entire width - that is to say with the exception of any mounting points at the ends - of the loading opening.

In order to be capable of favorably withstanding the forces which occur, the pivoting shaft is axially and/or radially supported on mounting points in the region of the lateral delimitations of the loading opening. It is also possible for the pivoting shaft to be mounted in mounting brackets on the upper delimiting wall of the receiving space.

One structurally simple implementation provides that the pivoting shaft has, as a rotary element, an internally mounted tube or a rod which is mounted by means of its casing. Here, the connecting means can be arranged at connecting points which are distributed discretely or are continuous along the pivoting shaft.

In order to allow simple coupling, the pivoting shaft can in particular have multi-sided or polygonal profiled elements as connecting means for a rotationally fixed, positively locking connection to the auxiliary tool.

The connecting means are advantageously designed for the auxiliary tool to be suspended on, plugged onto and/or

screwed onto the pivoting shaft. It is possible for the tool to be exchanged particularly quickly and at the same time to be securely retained in that the connecting means comprise a laterally protruding plug-in spigot on the pivoting shaft and a receiving shoe which is arranged on the auxiliary tool, can be placed onto the plug-in spigot and can be fixed by means of a securing element.

In order to provide additional mounting points, it is possible for the pivoting shaft to be composed linearly of a plurality of rotationally fixedly connected sections.

One embodiment which is advantageous with regard to unimpeded attachment of the tool to the arm provides that the pivoting drive is preferably arranged eccentrically on an upper delimiting wall of the receiving space.

The pivoting drive is advantageously formed by a hydraulic lifting cylinder which is coupled to the pivoting shaft.

For an expanded functional scope, it is particularly advantageous for the optional auxiliary tool to be formed by at least one gripping finger or a flap part, in particular a sludge flap or a sorting sieve. A further improvement is obtained in that a cleaning tool is provided as the auxiliary tool which can be pivoted into the digging device in order to clean the receiving space. It has surprisingly been shown here that effective cleaning is possible if the cleaning device comprises two scrapers which can be guided along so as

to scrape the inside of the side walls of the digging device, and have a curved cutting edge.

It should be ensured in any case that the coupling means provided for connecting the digging device to the arm protrude freely from the pivoting shaft on the digging device.

It is also advantageous if the upper delimiting wall of the receiving space is reinforced by a stiffening element.

The invention is explained in more detail in the following on the basis of an exemplary embodiment which is schematically illustrated in the drawing, in which:

Figure 1 shows a perspective view of a working device for a digger having a digging scoop and an add-on device;

Figure 2 shows a perspective view of an exchangeable auxiliary tool for the add-on device;

Figures 3 and 4 show, in a vertical section perpendicular to the pivoting axis, the working tool from figure 1 with the auxiliary tool in the opened and closed pivoting positions,

Figures 5 and 6 show, in a partially sectioned side view and a partially sectioned plan view, a further embodiment of an auxiliary tool to be connected to a pivoting shaft;

Figures 7 and 8 show a cleaning scraper as an auxiliary tool in the detached and pivoted-in positions in combination with the digging scoop.

The working tool illustrated in the drawing is composed substantially of a deep scoop as a digging device 10 and an add-on device 12, which is arranged as a modular unit on said digging device 10, for an exchangeable auxiliary tool 14, 16, 17.

The scoop 10 has a receiving space 24, which is delimited by side walls 18, an upper wall 20 and a lower wall 22, for the excavated material. To assist the digging process, a plurality of teeth 28 is arranged at a free edge 26 of the lower wall 22. Two mounting brackets 30 are provided on the upper delimiting wall for a pivoting connection, which is known per se, to an arm of a digger (not illustrated). The mounting brackets 30 have mounting eyes 32 for holding an arm pin and bores 34 for coupling on a drive piston.

The add-on device 12 comprises a pivoting drive 36 which is embodied as a hydraulic cylinder and is supported at the cylinder side in mounting brackets 38 on the upper delimiting wall 20 of the scoop 10. At the linkage end of its piston rod, the hydraulic cylinder 36 is fixedly connected to a pivoting shaft 42 by means of an angled pivoting lever 40.

The pivoting shaft 42 runs parallel to the arm pin (mounting eyes 32) provided on the arm for a pivoting movement of the scoop 10. Said pivoting shaft 42 extends between the side walls 18 over the full width of the scoop opening 43 in the upper edge region thereof. As can also be

seen from figures 3 and 4, the pivoting shaft is formed by a tube 44 which is rotatably mounted on a fixed inner axle rod 46 and is axially supported at each of its ends against a collar 48 of the axle rod 46.

Figures 1 and 2 illustrate, by way of example, gripping fingers 14 and a flap-like sorting sieve 16 as auxiliary tools. The auxiliary tools 14, 16 can be rotationally fixedly connected to the pivoting shaft 42 by connecting means 50 for a pivoting movement. The connecting means 50 comprise a plurality of screw lugs 52, which are welded to the pivoting shaft 42 so as to be distributed at a distance from one another in pairs, for a screw connection 54 in combination with a positively locking connection 56 of the auxiliary tools 14, 16 to the pivoting shaft 42. This makes it possible to quickly exchange the auxiliary tools 14, 16 according to the desired working application.

It is fundamentally also possible, by means of a profiled element of the pivoting shaft, to provide any desired connecting points for the auxiliary tools to be axially plugged on, or suspended by means of their casing, in a positively locking and rotationally fixed manner.

In order to be capable of better withstanding the forces which act on the scoop 10, the latter is reinforced in the region of its upper wall 20 at the inside by means of a stiffening element 58 which is embodied as an angled plate.

The coupling of the scoop 10 to the digger arm by means of the mounting brackets 30 does not require any assembly work of the hydraulic cylinder 36. It is necessary only to provide the hydraulic connections for the latter by means of suitable lines. An actuation of the hydraulic cylinder 36 causes the toothed gripping finger 14 to pivot relative to the scoop 10 or the receiving opening 43 thereof (figures 3, 4), so that for example tree trunks or stone chippings can be captively held. By using a sorting sieve as per figure 2, it is possible for small parts of the excavated material to be discharged from the receiving space 24 of the scoop 10 via the free intermediate spaces 60 of said sorting sieve, while relatively large parts are retained. It would also be correspondingly possible to use a sludge flap for filtering out liquid constituents. Here, said connecting means 50, as a quick-exchange system, permit a quick exchange with little manual expenditure.

Figures 5 to 8 show a further embodiment of the connecting means 50. Radially protruding plug-in spigots 70 are welded to connecting points provided for this purpose, while the auxiliary tool 14, 17 has a corresponding receiving shoe 72 which can be placed in a clamped manner onto the plug-in spigot 70 and can be fixed thereon by means of a securing pin 73 which can be screwed in from the side. The gripping finger 14 shown in figure 5 is provided with a detachable toothed rail 74 in order to be better capable of

retaining the material to be gripped, for example tree trunks.

In the exemplary embodiment shown in figures 7 and 8, a cleaning device 17 for scraping out the receiving space 24 is provided as an auxiliary tool 17. It is also possible here to provide a quick-exchange connection by means of plug-in spigots 70 on the shaft and receiving shoes 72 on the tool. The cleaning device 17 is formed by two flat scrapers 76 which are arranged at a lateral distance from one another and are guided along so as to scrape the inner surfaces of the side walls 18 in order to scrape off any stuck-on dirt. The flat scrapers 76 have a curved cutting edge 78 which, as it advances in the pivoting-in direction, sweeps across almost the entire lateral inner surface. It has surprisingly been shown that this is entirely sufficient for effectively cleaning the inner space 24.